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LONG-RANGE EFFECT OF PRE-SCHOOLING ON READING ACHIEVEMENT. STUDY III.

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SIX NEW YORK CITY DAY CARE CENTERS WITH PROGRAMS SIMILAR TO HEAD START WERE SELECTED AS STUDY SAMPLES TO DETERMINE WHETHER THERE IS A MEASURABLE LONG-RANGE EFFECT OF PRE-SCHOOLING UPON READING ACHIEVEMENT. EACH CENTER WAS CONSIDERED TO HAVE A GOOD PROGRAM, HAD BEEN OPERATING FOR AT LEAST SIX YEARS, AND HAD RACIALLY MIXED POPULATIONS. DAY CARE CENTER RECORDS WERE USED TO TRACE CHILDREN ORIGINALLY IN THE CENTERS TO PUBLIC ELEMENTARY SCHOOLS WHERE THEY WOULD BE IN THIRD, FOURTH, AND FIFTH GRADES. GRADE-EQUIVALENT SCORES FROM METROPOLITAN ACHIEVEMENT TEST I WERE RECORDED FOR ALL TESTED CHILDREN, INCLUDING DAY CARE CENTER GRADUATES. UNCONTROLLED INFLUENCES AND ERROR INTRODUCED BY THE METHOD USED CREATED DIFFICULTIES IN ISOLATING AND MEASURING THE INFLUENCE OF PRE-SCHOOLING. A GREATER NUMBER OF DAY CARE CENTER GRADUATES SCORED AT OR ABOVE GRADE LEVEL THAN THEIR CLASSMATES, ALTHOUGH THIS NUMBER DECLINES AS GRADE LEVEL RISES. THE EVIDENCE IS INSUFFICIENT TO SUPPORT THE HYPOTHESIS THAT DAY CARE CENTERS WERE THE ONLY OR EVEN THE MAJOR FACTOR IN ACADEMIC SUCCESS, BUT IT IS SUFFICIENT TO WARRANT FURTHER STUDY. (SEE ALSO PS 000 281, PS 000 282, PS 000 284, PS 000 285, PS 000 286.) (LG)

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STUDY III

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Long-Range Effect of Pre-schooling on Reading Achievement

by

Max Wolff and Annie Stein

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I. Introduction

The widespread interest in pre-school education that has made the Head Start program the most popular of the anti-poverty efforts has challenged researchers to learn more about the influence of pre-schooling on academic success, particularly for children of low-income and minority-group families. Researchers have found* that significant gains in I. Q. were made by children in the Head Start program from June to September, 1965 as compared with a control group of children who had not participated in the program. Study I of this Project, which examined the children in kindergarten classes six months after the summer, 1965 Head Start program in New York City, found that, although those who had had Head Start were ranked higher in "readiness to enter first grade," their scores in the Pre-school Inventory test (Caldwell) were not significantly different from those of their classmates who had not had Head Start.

Study III sought to determine whether there is a measurable long-range "sleeper" effect that does not show up until later in the child's school career. New York City's Day Care program offers an unique opportunity for examining this long-range effect for several reasons: it is a well-established program that has been in operation for more than 15 years; its curriculum is similar to that of Head Start, although there is variation from Center to Center; children attend for a full day (Centers are open from

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*L. Eisenberg and C. K. Conners, "The Effect of Headstart on Developmental Processes," presented at 1966 Joseph P. Kennedy Jr. Foundation Scientific Symposium on Mental Retardation, Boston, April 1966.

8 A.M. to 6 P.M. with most children attending from 9 A.M. to 4 P.M.) and remain in the Center as long as three years, going directly into first grade after graduation. Most important for purposes of comparative study, however, the children come from low-income families and neighborhoods very similar to those of children in the Head Start program.

One fundamental difference between the Day Care population and the Head Start population must be borne in mind in evaluating the results of this study. Day-care is offered to children of working parents only. The few exceptions are cases where the mother or guardian is unable to care for the child. In contrast, Study I found that less than 20 percent of the mothers of Head Start children are working women.

More difficulties than expected were encountered by the study in finding the children who had had Day Care schooling sufficiently long ago to make long-range comparisons. The sample is neither as large nor as random as one would want for purposes of generalization of the findings. However, the trend is consistent and the differences between scores for Day Care children and their classmates is sufficiently large to indicate that further research with the Day Care population will be productive.

II. Method

The method employed was dictated by the fact that the public elementary schools do not keep uniform records of the pre-school experience of their pupils. To find the pupils who had had Day-Care, it was necessary to go back to the Day Care Centers and from their records to trace their graduates into the public schools to which they had been assigned. Difficulties were further compounded by the lack of uniformity in Day Care Center records of public schools that received their graduates.

Six Day Care Centers were chosen with the help of the Director of Day Care of the Department of Public Welfare. The criteria for choice were: that the Centers were considered to have a good program, that they had been operating for at least six years and that they were in neighborhoods where the public schools to which the children were later admitted had an ethnic/racial composition similar to the Centers. The names, addresses, race, age and length of time in Day Care were recorded for all Center graduates of June 1961, 1962 and 1963 and, where available, the public school to which the child had been assigned. Only children who had had more than a year of Day Care (the equivalent of the year of kindergarten other children have) were included. We then traced these individual children to the public schools they had entered.

We found 101 of the Day Care graduates of the six selected Centers in nine public elementary schools. These children were in the 3rd, 4th and 5th grades of elementary school at the time of the study (Spring, 1966). We recorded the grade-equivalent scores achieved by each graduate in the Metropolitan Achievement Reading Test I, Elementary or Upper Primary (Word Knowledge), administered to him when he was in the 3rd grade, recording as well the scores of all the children who took that test that year in that school. These scores were found either on the individual permanent record cards of the children or, where the schools had kept a tally of the individual scores in the 3rd grade test, those tally sheets were copied.

This method introduces error discussed further below since the permanent record card travels with the child as his family moves out of a neighborhood. Where our findings come from record cards, the child is still in the same school he entered after graduation from Day Care. This could be as long as

five years for June, 1961 graduates. Where the scores were taken from tally sheets, the child needed to have remained in the same school only until the third grade when he was tested.

Graduates of Day Care Centers in the years 1961, 1962 and 1963 took their 3rd-grade reading tests in April, 1964, April 1965 and in October, 1965. In order to make the scores comparable, the grade equivalents were converted to deviations from grade level, with grade level for each examination equated to 0.0. All tables in this report are given in terms of deviations from grade level.

The sample of 101 Day Care graduates is obviously not a random sample of even the children who attended the six Centers chosen. About 450 children were graduated from these Centers in the years selected. The 101 graduates, although they comprise a substantial proportion (23 percent) of the group, were selected only because they were found to be still in the neighborhood public schools, some for the three years until they were tested and some, as discussed above, for as long as five years. They are, in effect, selected for family stability or perhaps immobility, since we have no way of knowing whether this factor is a good or a bad influence on their achievement scores. In any case, they differ in this regard from the control group of all their grademates in the third grade who necessarily evidence the mobility patterns of the entire population zoned into the school.

Some additional error may be introduced by the combining of the scores on the three separate tests. Although grade equivalencies are considered readily comparable, there are differences from year to year in test difficulty and perhaps other differences that are not totally eliminated by

conversion to grade equivalents in tests given to children in October and those given in April after the children are used to their teachers.

The sample of 101 graduates does have some advantages. Since it was taken from nine different public schools located in three boroughs of New York City, it minimizes, if it does not eliminate, differences in scores attributable to differences in the quality of schools or teachers.

The small size of the sample of Day Care graduates compared to the large number of their grademates in the study (3,378) is also a drawback, but this is counteracted by the fact that the findings are stable and internally consistent as the sample is broken down into its subgroups.

In summary, the purpose of the study design was to isolate and examine the influence of the pre-schooling in Day Care programs on the 3rd grade reaching achievement of public school pupils in low-income minority-group areas of New York City. Some factors influencing their 3rd grade achievement, however, were unable to be controlled so that conclusions about the unique influence of pre-schooling must be made with caution. These uncontrolled influences on achievement are:

1. The original selection of pupils into the Day Care program (see Introduction) is controlled for economic and minority-group status, but differs from the general population in that their mothers are working or incapacitated.

2. The length of time in pre-school may vary from one to three years for an individual child.

3. Family residential stability or immobility of the 101 Day Care graduates is certain to be greater than that of the remaining 349 graduates in those years, since they could not be found in the area.

4. Variations in difficulty of test cause a less significant error in comparing this sample with all grademates (including the sample) since these differences affect both groups alike. Error might appear in comparisons of scores of all children across the three years.

Factors that are controlled are:

1. Family racial and ethnic composition and minority-group ghetto residence.
2. Range of quality of Day Care programs.
3. Variations in public school and teacher quality.
4. Uniformity of achievement test and its administration for sample and controls.

The study population consists of:

Location of public school	Total tested* in 3rd. gr.	D.C. graduates tested	Racial/ethnic school composition Percent		
			Negro	Puerto Rican	Other
Bedford-Stuyvesant, Brooklyn	235	4	97%	3%	0%
South Bronx	479	3	80	20	0
" "	451	11	76	23	1
Bedford-Stuyvesant	314	11	70	30	0
Williamsburg, Bklyn.	401	9	64	35	1
Morrisania, Bronx	272	14	52	45	3
East Harlem, Manhattan	509	13	50	50	0
" " "	346	14	47	53	0
Lower East Side, Man.	371	22	40	50	10
Totals	3,378	101			

*Includes Day Care graduates tested.

III. Findings

A. Percentage distributions of Day Care graduates' scores compared to scores of all third graders.

A substantially greater proportion of Day Care graduates scored at or above grade level than their classmates. Fewer scored below grade. As shown in Table 1., nearly 23 percent of Day Care graduates scored at or above grade compared to a scant 14 percent of their grademates in the 3rd grade reading achievement test. The overwhelming majority of the children in these schools read below grade level, but this large majority was 77 percent for the Day Care graduates as contrasted with 86 percent of the total grade. Table 1. shows the distribution of scores for Day Care graduates and for all children in the grade.

TABLE 1.

READING SCORES OF ALL 3rd-GRADE CHILDREN TESTED* AND OF DAY CARE GRADUATES IN NINE PUBLIC ELEMENTARY SCHOOLS, 10/65, 4/65 and 4/64 TESTS COMBINED
Relative frequency distributions of deviations from grade level.

Year and month deviations from grade level	Percent: All third-graders		Percent: Day Care graduates	
Over +1.0	2.9%		7.9%	
+0.6 through +1.0	3.6		5.0	
+0.1 " +0.5	6.5	13.8	5.9	22.7
0.0 grade level	0.8		3.9	
-0.1 through -0.5	13.6		10.9	
-0.6 " -1.0	19.1		19.8	
-1.1 " -1.5	28.0	86.2	24.8	77.3
-1.6 " -2.0	19.3		19.8	
Over -2.0	6.2		2.0	
	100.0%		100.0%	
(Number tested)	(3,378)		(101)	

*Metropolitan Achievement Reading Test I (Elementary or Upper Primary), (Word Knowledge) Third Grade.

B. Comparison of median scores

1. There was a two-month difference* in the median scores of Day Care graduates and their grademates, with Day Care children showing the higher median score. For all schools combined and all three tests combined, the median score for Day Care graduates was nine months below grade level as compared with one year, one month below grade level for all the children tested.

2. A further examination of the differences in median scores shows that the advantage held by Day Care graduates lies entirely in the group of children who score at or above grade level. The Day Care children who scored below grade level had the same median score as their below-grade level grademates. The Day Care children who scored at or above grade level had a median score three months higher than their comparable grademates.

When we combine the relative frequency findings and the median scores it becomes clear that those children who had Day Care had an advantage over their grademates since more of them scored at or above grade level and scored higher. For the group of Day Care graduates who scored below grade level, however, (77 percent of the Day Care graduates) there was no higher achievement than for their grademates. Both groups read one year, three months behind grade level on the average in the third grade.

	Median scores	
	All third-graders	Day Care graduates
Children at or above grade level	+0.5	+0.8
Children below grade level	-1.3	-1.3

*In conversion of raw scores to grade equivalents a two-month difference is not considered significant. However, since the median averages the individual scores, rounding errors are compensated for and a two-month difference, if it is consistent throughout the subgroups, has significance.

Findings A and B indicate that children who had Day Care preschooling have a qualitative advantage over their grademates three years later. The size of this advantage, however, is sharply limited. More than three-fourths of the Day Care graduates, those scoring below third grade level, have no advantage over their grademates, both scoring an average (median) of one year, three months below grade level. The Day Care graduates who score below grade level distribute themselves in much the same way as their grademates, as shown in Table 1.

Twenty-three percent of the Day Care graduates score at or above grade level. For these children, there is the added advantage that they score higher on the average than their successful grademates, i.e. those who read at or above grade level.

If we could attribute all of this difference in success in reading to the influence of the Day Care pre-schooling, we would approach a quantitative finding that about nine percent of the Day Care graduates (the difference between the 77 percent of Day Care graduates who score below grade and the 86 percent of their grademates who score below grade) who would have been below grade are in fact at or above grade in reading because of their Day Care experience.

C. <u>Percentage distribution of scores on each of three tests</u>.

Small samples are quite usable if internal evidence exists as to the stability of the factors involved as shown by relative stability of the relevant coefficients for different parts of the whole sample. With this in view, Table 2. presents the distribution of scores for each of the three tests.

Table 2.

READING SCORES OF ALL 3rd-GRADE CHILDREN TESTED AND OF DAY CARE GRADUATES IN NINE PUBLIC SCHOOLS ON TESTS ADMINISTERED 10/65, 4/65 and 4/64.
Relative frequency distributions of deviations from grade level.

Year and month deviations from grade level	Percent 10/65 All 3rd graders	10/65 Day Care graduates	4/65 All 3rd graders	4/65 Day Care graduates	4/64 All 3rd graders	4/64 Day Care graduates
Over +1.0	2.2%	8.9%	3.8%	8.1%	2.4%	5.3%
+0.6 through +1.0	3.1	-	4.0	8.1	3.8	10.5
+0.1 " +0.5	5.5	8.9	6.0	5.4	9.4	-
0.0 grade level	1.9	8.9	-	-	0.3	-
-0.1 through -0.5	13.8	11.1	12.7	13.5	14.9	5.3
-0.6 " -1.0	18.7	6.7	21.4	27.1	15.6	36.8
-1.1 " -1.5	39.0	37.8	20.9	13.5	20.3	15.8
-1.6 " -2.0	12.9	17.7	22.3	24.3	25.9	15.8
Over -2.0	2.9	-	8.9	-	7.4	10.5
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
(Number tested)	(1347)	(45)	(1337)	(37)	(694)	(19)

To facilitate comparisons with the combined test scores, Table 2. is summarized thus:

	Percentage distributions							
	All tests combined		10/65		4/65		4/64	
	All ch.	D.C.	All ch.	D.C.	All ch.	D.C.	All ch.	D.C.
On grade or above	14%	23%	13%	27%	14%	22%	16%	16%
Below grade	86/100	77/100	87/100	73/100	86/100	78/100	84/100	84/100
(Number tested)	(3378)	(101)	(1347)	(45)	(1337)	(37)	(694)	(19)

Two of the three tests show a consistent pattern of substantially higher proportions of Day Care graduates scoring at or above grade level than their classmates. For the earliest test (4/64) the percentages scoring at or above grade level are about the same. However, as shown in Table 2., even on this test the Day Care graduates who were at or above grade level all scored more than six months above level. Of their grademates a little more than six percent scored that high as opposed to 16 percent of the Day Care graduates. The very small number of Day Care graduates who took the 4/64 examination (19) undoubtedly influences the spottiness of the distribution.

The conclusion from this is that the finding for all three tests combined is reinforced, since the differential in favor of Day Care graduates is clearly present for the 10/65 and 4/65 parts of the whole sample, appreciably greater for 10/65 than for 4/65. It is perhaps just discernable for the 4/64 part.

A curious finding is that the proportion of Day Care children who score at or above grade level declines the older the test administered, but the trend for their grademates is the reverse. Expressed graphically

this would show that the curve of the percent of sucessful third graders as a whole goes down from April, 1964 to October, 1965 while Day Care graduates' curve of percent of successful readers goes sharply up.

There are several ways to interpret this finding that would merit further research:

1. The immobility or stability factor, strongest for the oldest test given to children who must have lived in the neighborhood for over three years at the least, ranging to over five years for those children still in the public school. If this factor militates against success in reading, it would account for the lower number scoring above grade in the earliest test and would account for the trend up as we come to the more recent tests.

2. Increased emphasis on pre-reading skills in the Day Care program: this did occur in the years covered, partly as the result of the recent general widespread interest in pre-schooling.

3. The higher value placed on pre-schooling by the public schools following the rise in interest in pre-schooling may have tended to favor the children who had had Day Care in their public school classes.

4. The small size of the April, 1964 sample of Day Care graduates may distort the picture, although the trend of the three tests is consistent, giving greater weight to this finding.

5. The decline in success for the grade as a whole (from 16 percent at or above grade level in 4/64 to 13 percent in 10/65) although small, is important to research further since these were the years of active experimentation and concern about reading retardation when improvement would be expected.

D. Comparisons of scores of all third-graders and Day Care graduates in schools that are predominantly Negro and those with close to or more than 50 percent Puerto Rican children.

Taking the five schools that have more than 64 percent Negro pupils with the remainder almost entirely Puerto Rican children and comparing them with the four schools that have 45 percent or more Puerto Rican children, we find no significant differences in either the distribution of scores or in the average score, for the grade as a whole. The scores of the Day Care children in the predominantly Negro schools have a median that is one month above the median score for Day Care graduates in the largely Puerto Rican schools. The medians are:

	Negro schools	P. R. schools
All children	-1.1	-1.1
Day Care graduates	-0.9	-1.0

It would be hazardous to suggest that there is any significance in the 1-month difference between the Day Care graduates' scores. However, the pattern of higher median scores for Day Care graduates than for their grademates in this subgrouping of the total sample reinforces the earlier finding of consistent advantage, though small, for those who attended the Day Care Centers.

The frequency distributions of the scores achieved in the two groups of schools is given in Table 3. It shows no differences between the proportion of Day Care graduates reading on or above grade level for the two groups of schools but does reinforce the finding of advantage to Day Care graduates over their grademates in the proportion who are succeeding in school.

Summarized, Table 3. shows:

	Predominantly Negro schools		Largely Puerto Rican schools	
	All ch.	D.C. grads.	All ch.	D.C. grads.
At or above grade level	14%	23%	13%	23%

TABLE 3.

READING SCORES OF ALL 3rd GRADE CHILDREN AND OF DAY CARE GRADUATES
BY ETHNIC COMPOSITION OF PUBLIC SCHOOL
Relative frequency distributions of deviations from grade level

Year and month deviations from grade level	Pred. Negro schools		Largely P.R. schools	
	All 3rd graders	Day Care graduates	All 3rd graders	Day Care graduates
Over +1.0	3.3%	7.5%	2.3%	8.2%
+0.6 through +1.0	3.6	0.0	3.4	8.2
+0.1 " +0.5	6.5	10.0	6.5	3.3
0.0 grade level	1.0	5.0	0.5	3.3
-0.1 through -0.5	14.4	12.5	12.7	9.8
-0.6 " -1.0	18.1	22.5	20.6	18.0
-1.1 " -1.5	26.0	20.0	30.5	27.9
-1.6 " -2.0	20.0	22.5	18.5	18.0
Over -2.0	7.1	0.0	5.0	3.3
	100.0%	100.0%	100.0%	100.0%
(Number tested)	(1880)	(40)	(1498)	(61)
Median score	-1.1	-0.9	-1.1	-1.0

IV. Conclusions

There is clear evidence that those children who had Day Care pre-schooling have a higher proportion of successful students in the third grade than their grademates. Further, the average scores in reading achievement tests for those reading at or above grade level is higher for Day Care graduates than for their successful grademates. Taken as a whole, the average scores of Day Care graduates are from one to two months higher than their grademates, those scoring below grade level showing no differential. These findings are consistent for two of the three subtests taken separately and all three combined as well as for the predominantly Negro schools compared as a group with the largely Puerto Rican schools.

There is sufficient evidence here to indicate that some factor or factors are at work to improve the academic success of the group of 101 Day Care graduates compared to their grademates. Undoubtedly their Day Care experience is one of the factors, but this study cannot say definitively that it is the only or even the major factor. The influence of family residential immobility (or stability), and of the initial selection of children of working mothers in the Day Care population cannot be disregarded nor can we say whether these influences are positive or negative, reinforcing or reducing the impact of the pre-schooling.

However, sufficient consistency of results is apparent to indicate the value of continued study of the Day Care population's success in school. A simple change in the public school record-keeping would make it possible to conduct a thorough study that would eliminate the factor of immobility (or stability). We suggest that the permanent record cards

of public school children uniformly register what pre-schooling the child has had. Records are now being kept showing whether or not the child had Head Start when he entered the kindergarten. We suggest that this be extended to include any pre-schooling, indicating the pre-school attended and the length of time the child participated in the pre-school program.

It would then be possible readily to compare the later achievement of any group of children the study would select, permitting more conclusive determination of both the immediate and the "sleeper" effect, if any, of pre-school education.

Alternatively, the Department of Public Welfare might consider establishing a procedure of following up its Day Care Center graduates to determine their later success in school since it is the purpose of the Day Care program to provide not just custodial care to children in need of it, but an educational program as well.

If the findings of this Study are borne out quantitatively in the further research suggested, we are still faced with the fact that only nine percent of the children who had Day Care pre-schooling have gained long-range academic benefits. Seventy-seven percent of even the Day-Care graduates read on the average at the one year, seven month level in the third grade. The magnitude and critical nature of reading retardation in the low-income, minority-group schools of New York City can be modified only slightly by pre-schooling.

It is evident that substantial improvement in the quality of education in the early elementary school grades is needed if the problem is to be more fully met.